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low; capsules striate, the ridges of 4 rows of cells, yellow and much thickened; teeth united in pairs, reflexed when dry, finely granulose, appearing striolate, smoother and trabeculate at apex, cilia 8, as long as the teeth and smooth; spores brown, warty. .024-.037 mm.

The leaves are very variable in the same plants. The younger ones at the tips of the stems are very long acuminate, the older ones are much broader, sometimes only acute.

We have the same species collected by J. B. Leiberg on *Tsuga Pattoniana*, Traille River Valley, Idaho, received January, 1890, No. 234. Also on *Alnus rubra*, Nooksack River, Whatcom county, Washington, W. N. Suksdorf, July 11, 1890, No. 71.

Club-Root in Common Weeds.

In some instances it has heretofore been somewhat difficult to fully account for the almost perennial presence of Club-root (*Plasmodiophora Brassicae* Wor.) in various cruciferous crops. Some fields of cabbage and turnip, in particular near New Brunswick, seemed to suggest that some of the cruciferous weeds might harbor the enemy, and with this suspicion in mind, strengthened by the knowledge of the wide range of hosts for the *Plasmodiophora* in the mustard family, Mr. J. A. Kelsey was asked to dig for the slime mould until, if possible, it was found. The lurking pest was not far to seek, and in a short time a hundred roots of the Shepherd's purse (*Bursa Pastoris*), and an equal number of the Hedge-mustard (*Sisymbrium vulgare*) were obtained in the vicinity of the infested cabbage and turnip fields.

Figure 1 shows a group of the *Bursa* roots affected with the *Plasmodiophora*. The roots of this weed are neither large nor fleshy like those of the turnip, and the galls are correspondingly small. Quite frequently the swollen portion is close below the crown, but in some cases the enlargement is midway of the root, and frequently there are smaller galls near the tips of the roots.

In *Sisymbrium* (figure 2) the galls are quite different in outline, being more nearly hemispherical and seemingly situated without any order. There may be three or more of the galls of equal size upon a single root. They are of a darker brown color than in the *Bursa*.

Both kinds of weeds, when badly infested, lose their healthy color, so much so that Mr. Kelsey was able to detect the worst cases of the disease from the dwarfed and sickly appearance of portions of the plant above ground.

Heretofore, so far as the books at hand, Saccardo, Zopf, Woronin, Sorauer, Frank, Eycleshymer, and others, instruct, the hosts

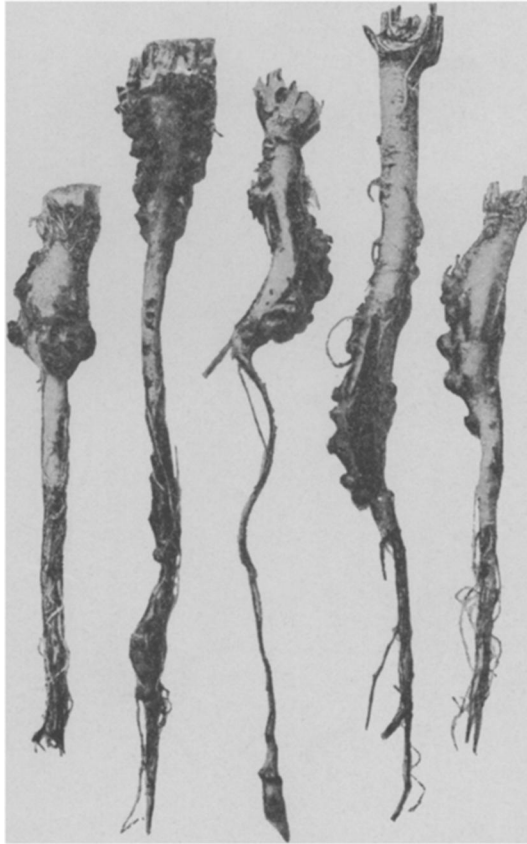


FIG. 1.

which have been definitely recorded are *Brassica oleracea*, with its varieties of cabbage, cauliflower, kale, Brussels sprouts, *Brassica Rapa*, *Raphanus sativus*, *Iberis umbellata* and *Matthiola incana*. It is therefore interesting to add two other genera to the list, and in the manner above intimated, namely, from suspicions that blossomed

with circumstantial evidence and reached full fruition in the discovery.

Of course, the strong, practical bearing of this literal unearthing of truth goes without further saying. The fact that these common

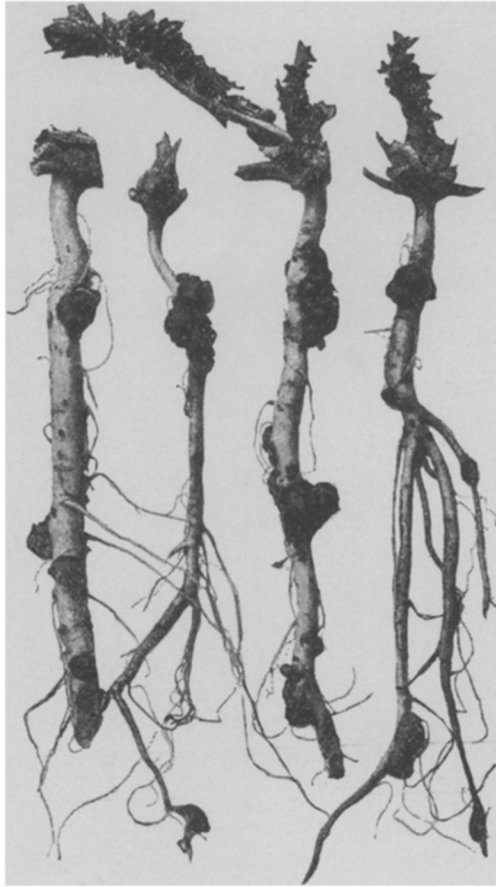


FIG. 2.

weeds are the secret hot-beds of this miserable pest is enough to cause the truck growers to raise the hand of destruction against them. It is likely that the number of species of cruciferous weeds bearing the *Plasmodiophora* can be increased as the search is continued.

BYRON D. HALSTED.

RUTGERS COLLEGE, January 12, 1894.